AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTH CARE

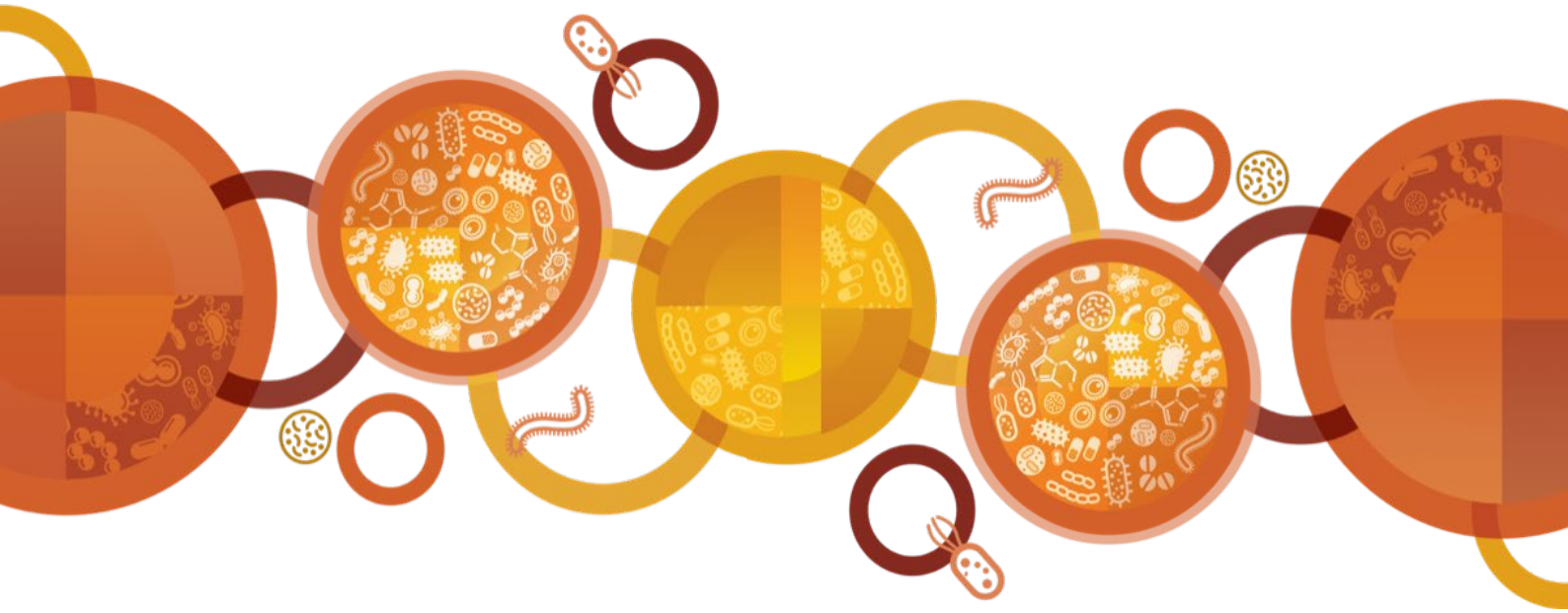
AURA Antimicrobial Use and Resistance in Australia

CARAlert THE NATIONAL ALERT SYSTEM FOR CRITICAL ANTIMICROBIAL RESISTANCE

CARAlert data update 31

1 January 2023–28 February 2023

April 2023



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Data Summary

This report provides an update on data submitted to the National Alert System for Critical Antimicrobial Resistances (CARAlert) for the reporting period: 1 January 2023 to 28 February 2023, and complements previous analyses of and updates on CARAlert data.

National overview

- Excluding those CARS that were introduced or removed in January 2023, the total number of critical antimicrobial resistances (CARs) reported was up 59.2% compared to the previous two-month reporting period (*n* = 336 versus *n* = 211)
- Just over one-half of the CARs reported were carbapenemase-producing *Enterobacterales* (CPE) (including those with ribosomal methyltransferase) (183/338, 54.1%)
- The total number of CPE (either alone or in combination with other CARs) reported to date this year, compared with the same period last year, increased by 72.6% (*n* = 183 versus *n* = 106)
- Azithromycin-nonsusceptible (low-level resistance) *Neisseria gonorrhoeae* was the second most reported CAR (86/338, 25.4%)
- The number of ceftriaxone-nonsusceptible and ceftriaxone- and azithromycin-nonsusceptible *N. gonorrhoeae* decreased compared with the previous two-month reporting period (*n* = 4 versus *n* = 7)
- Excluding *N. gonorrhoeae*, where the setting was known, the majority of CARs were reported from public hospitals (181/220, 82.3%). There were 28 (12.7%) reports from community settings, nine (4.1%) from private hospitals, and two reports (0.9%) from aged care homes.

Carbapenemase-producing *Enterobacterales*

- IMP (92/183, 50.3%), NDM (50/183, 27.3%), OXA-48-like (22/183, 12.0%), and NDM+OXA-48-like (12/183, 6.6%) types accounted for 96.2% of all CPE reported during this period
- The total number of CPE (either alone or in combination with other CARs) increased (*n* = 183, up 43.0%) compared to the previous two-month period (*n* = 128). The total number of IMP-types reported increased (*n* = 92) during this reporting period compared to the previous reporting period (*n* = 57). There was a two-fold increase in IMP-types reported from New South Wales (*n* = 50 versus *n* = 23)
- There was an increase in the total number of NDM-types (either alone or with OXA-48-like) (*n* = 65, up 41.3%) compared to the previous two-month period (*n* = 46). The increase was seen across all states and territories that report NDM-types
- Four KPC-producing *Klebsiella pneumoniae* were reported; two from Queensland, one from Victoria and one from New South Wales that also harboured NDM and OXA-48-like types
- Excluding CARs for which the setting was unknown, 10.3% (18/174) of CPE were reported from settings other than hospitals; 9.2% (16/174) and 1.1% (2/174) were from community settings and aged care homes, respectively
- Seven hospitals (*n* = 4 in New South Wales; *n* = 3 in Queensland) had more than two reports of IMP-types. A further 11 hospitals had two notifications of IMP-types: Queensland (*n* = 5), New South Wales (*n* = 4), Victoria (*n* = 1), Australian Capital Territory (*n* = 1). Three hospitals from New South Wales had seven or more reports
- Thirteen hospitals had more than one report of NDM-types; these were in New South Wales (*n* = 5), Victoria (*n* = 4), Queensland (*n* = 2), and South Australia (*n* = 2).

***Salmonella* and *Shigella* species**

- There were 10 ceftriaxone-nonsusceptible *Salmonella* species reported during this period: six *S.* Typhi from Victoria (*n* = 4, ESBL [3], AmpC [1]) and New South Wales (*n* = 2, ESBL [2]); and four non-typhoidal species from New South Wales (AmpC [1]), Victoria (ESBL [1]), Queensland (AmpC [1]) and Western Australia (AmpC [1])
- There were 32 multidrug-resistant (MDR) *Shigella* species reported in this period: 18 *S. sonnei* and 14 *S. flexneri*. Almost all (17/18, 94.4%) *S. sonnei* isolates were

ceftriaxone/cefotaxime resistant and produced an ESBL. A substantial majority (12/14, 85.7%) of MDR *S. flexneri* were susceptible to ceftriaxone/cefotaxime.

Azithromycin-nonsusceptible (low-level resistance, MIC < 256 mg/L) *N. gonorrhoeae*

- The total number of reports of this CAR increased almost five-fold compared with the previous two-month reporting period (*n* = 86 versus *n* = 18). Reports were from New South Wales (*n* = 33 versus *n* = 1), Victoria (*n* = 45 versus *n* = 10), Queensland (*n* = 3 versus *n* = 5), South Australia (*n* = 2 versus *n* = 2), Western Australia (*n* = 2 versus *n* = 0) and Tasmania (*n* = 1 versus *n* = 0).

Ceftriaxone- and/or azithromycin-nonsusceptible *N. gonorrhoeae*

- There were four reports of ceftriaxone-nonsusceptible *N. gonorrhoeae*; three from New South Wales, and one from Victoria that had high-level resistance to azithromycin
- One *N. gonorrhoeae* with high-level resistance to azithromycin was reported from New South Wales.

Gentamicin-resistant *N. gonorrhoeae*

- No gentamicin-resistant *N. gonorrhoeae* were reported in this period.

Ciprofloxacin-nonsusceptible *N. meningitidis*

- There were two reports of ciprofloxacin-nonsusceptible *N. meningitidis* from Victoria.

Carbapenemase-producing *Acinetobacter baumannii* complex and *Pseudomonas aeruginosa*

- Five carbapenemase-producing *A. baumannii* complex were reported during this period. The reports were from Victoria ($bla_{\text{OXA-23}}$, *n* = 2; $bla_{\text{OXA-23}}$ + $bla_{\text{OXA-72}}$, *n* = 1), New South Wales ($bla_{\text{OXA-23}}$, *n* = 1) and Western Australia ($bla_{\text{OXA-23}}$, *n* = 1)
- The number of carbapenemase-producing *P. aeruginosa* reports decreased compared to the previous two-month reporting period (*n* = 4 versus *n* = 8). Reports were from Victoria ($bla_{\text{VIM-1}}$, *n* = 1; $bla_{\text{VIM-2}}$, *n* = 1), South Australia (NDM, *n* = 1), and Western Australia ($bla_{\text{VIM-2}}$, *n* = 1).

Linezolid-resistant *Enterococcus* species

- Four linezolid-resistant *Enterococcus* species were reported during this period: three *E. faecium* from New South Wales (23S rRNA, *n* = 2) and the Australian Capital Territory (23S rRNA, *n* = 1), and one *E. faecalis* from Western Australia (*optrA*, *n* = 1).

Candida auris

- Four *Candida auris* were reported during this period.

Linezolid-, or vancomycin-nonsusceptible *Staphylococcus aureus* complex

- There were no reports of linezolid- or vancomycin-nonsusceptible *S. aureus* in this period.

Transmissible colistin resistance (other than that seen in combination with CPE)

- No *Enterobacterales* with transmissible (*mcr* genes other than *mcr-9*) colistin resistance were reported during this period.

***Streptococcus pyogenes* with reduced susceptibility to penicillin**

- No cases of *S. pyogenes* with reduced susceptibility to penicillin were reported during this period.

National summary

Table 1: Number of critical antimicrobial resistances, by state and territory, 1 January 2023–28 February 2023, and year to date 2022 and 2023

Species	Critical resistance	State or Territory (January–February 2023)								Bi-monthly			Year to date		
										2022	2023				
		NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Nov-Dec	Jan-Feb	Relative change*	2022	2023	Relative change*
Acinetobacter baumannii complex	Carbapenemase-producing	1	3	0	0	1	0	0	0	1	5	▲ 400%	1	5	▲ 400%
	Carbapenemase- and ribosomal methyltransferase-producing	0	0	0	0	0	0	0	0	1	0	▼ 100%	0	0	–
Candida auris	–	0	1	0	0	3	0	0	0	2	4	▲ 100%	1	4	▲ 300%
Enterobacterales	Carbapenemase-producing	69	37	43	7	8	0	2	2	114	168	▲ 47.4%	104	168	▲ 61.5%
	Carbapenemase- and ribosomal methyltransferase-producing	5	8	0	1	1	0	0	0	13	15	▲ 15.4%	2	15	▲ 650%
	Ribosomal methyltransferase-producing	0	2	0	0	1	0	0	0	3	3	0.0%	0	3	–
	Transmissible resistance to colistin	0	0	0	0	0	0	0	0	1[†]	0	–	0	0	–
Enterococcus species	Linezolid-resistant	2	0	0	0	1	0	0	1	3	4	▲ 33.3%	3	4	▲ 33.3%
Mycobacterium tuberculosis	Multidrug-resistant – at least rifampicin- and isoniazid-resistant strains	0	0	0	0	0	0	0	0	0	0	–	4	0	▼ 100%
Neisseria gonorrhoeae	Azithromycin-nonsusceptible (low-level)[§]	33	45	3	2	2	1	0	0	18	86	▲ 378%	13	86	▲ 562%
	Azithromycin-nonsusceptible (high-level)[#]	1	0	0	0	0	0	0	0	1	1	0.0%	0	1	–
	Ceftriaxone-nonsusceptible	3	0	0	0	0	0	0	0	6	3	▼ 50.0%	3	3	0.0%
	Ceftriaxone-nonsusceptible and azithromycin-nonsusceptible	0	1	0	0	0	0	0	0	1	1	0.0%	1	1	0.0%
	Gentamicin-resistant**	0	0	0	0	0	0	0	0	–	0	–	–	0	–

– = not applicable

Note: For this report, transmissible resistance to colistin refers to the presence of *mcr* genes other than *mcr-9*. This variant is not associated with a colistin resistant phenotype, but is typically found on H12 plasmids which may carry $bla_{\text{IMP-4}}$.

Table 1 (continued)

Species	Critical resistance	State or territory (January–February 2023)								Bi-monthly			Year to date		
										2022	2023				
		NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Nov-Dec	Jan-Feb	Relative change*	2022	2023	Relative change*
Neisseria meningitidis	Ciprofloxacin-nonsusceptible**	0	2	0	0	0	0	0	0	–	2	–	–	2	–
Pseudomonas aeruginosa	Carbapenemase-producing	0	2	0	1	1	0	0	0	8	4	▼ 50.0%	10	4	▼ 60.0%
	Carbapenemase- and ribosomal methyltransferase-producing	0	0	0	0	0	0	0	0	0	0	–	1	0	▼ 100%
Salmonella species	Ceftriaxone-nonsusceptible	3	5	1	0	1	0	0	0	8	10	▲ 25.0%	8	10	▲ 25.0%
Shigella species	Multidrug-resistant	3	25	3	0	1	0	0	0	30	32	▲ 6.7%	9	32	▲ 256%
Staphylococcus aureus complex	Daptomycin-nonsusceptible‡	–	–	–	–	–	–	–	–	22	–	–	28	–	–
	Linezolid-nonsusceptible	0	0	0	0	0	0	0	0	1	0	▼ 100%	1	0	▼ 100%
	Vancomycin-nonsusceptible	0	0	0	0	0	0	0	0	0	0	–	0	0	–
Streptococcus pyogenes	Penicillin reduced susceptibility	0	0	0	0	0	0	0	0	0	0	–	0	0	–
	Total (reported by 31 March 2023)	**120**	**131**	**50**	**11**	**20**	**1**	**2**	**3**	**233**	**338**	**▲ 45.1**	**189**	**338**	**▲ 78.8%**
	Excluding CARs added or removed in 2023									**211**	**336**	**▲ 59.2**	**161**	**336**	**▲ 109%**

MIC = minimum inhibitory concentration; – = not applicable

* Relative change = absolute change between period in 2022 and same period in 2023, for each CAR, expressed as a percentage of 2022 base
† Transmissible resistance to colistin and carbapenemase-producing
§ Azithromycin MIC < 256 mg/L
# Azithromycin MIC ≥ 256 mg/L
** Reported from January 2023
‡ Reporting of daptomycin-nonsusceptible *S. aureus* was suspended from January 2023

Note: The number of CARs for 2022 have been updated to include additional submissions received after the previous publication date.

Table 2: Number of critical antimicrobial resistance isolates, by setting, national, 1 January 2023–28 February 2023

Species	Critical resistance	Setting					Total
		Public hospital	Private hospital	Aged care home	Community	Unknown	
Acinetobacter baumannii complex	Carbapenemase-producing	4	1	0	0	0	5
	Carbapenemase- and ribosomal methyltransferase-producing	0	0	0	0	0	0
Candida auris	–	4	0	0	0	0	4
Enterobacterales	Carbapenemase-producing	135	7	2	15	9	168
	Carbapenemase- and ribosomal methyltransferase-producing	14	0	0	1	0	15
	Ribosomal methyltransferase-producing	3	0	0	0	0	3
	Transmissible resistance to colistin	0	0	0	0	0	0
Enterococcus species	Linezolid-resistant	4	0	0	0	0	4
Mycobacterium tuberculosis	Multidrug-resistant – at least rifampicin- and isoniazid-resistant strains	0	0	0	0	0	0
Neisseria gonorrhoeae	Azithromycin-nonsusceptible (low-level)*	2	0	0	45	39	86
	Azithromycin-nonsusceptible (high-level)†	0	0	0	0	1	1
	Ceftriaxone-nonsusceptible	0	0	0	0	3	3
	Ceftriaxone-nonsusceptible and azithromycin-nonsusceptible	0	0	0	0	1	1
	Gentamicin-resistant#	0	0	0	0	0	0
Neisseria meningitidis	Ciprofloxacin-nonsusceptible#	0	0	0	2	0	2
Pseudomonas aeruginosa	Carbapenemase-producing	3	0	0	1	0	4
	Carbapenemase- and ribosomal methyltransferase-producing	0	0	0	0	0	0
Salmonella species	Ceftriaxone-nonsusceptible	7	0	0	2	1	10
Shigella species	Multidrug-resistant	7	1	0	7	17	32
Staphylococcus aureus complex	Linezolid-nonsusceptible	0	0	0	0	0	0
	Vancomycin-nonsusceptible	0	0	0	0	0	0
Streptococcus pyogenes	Penicillin reduced susceptibility	0	0	0	0	0	0
	Total (reported by 31 March 2023)	**183**	**9**	**2**	**73**	**71**	**338**

* Azithromycin MIC < 256 mg/L
† Azithromycin MIC ≥ 256 mg/L
# Reported from January 2023

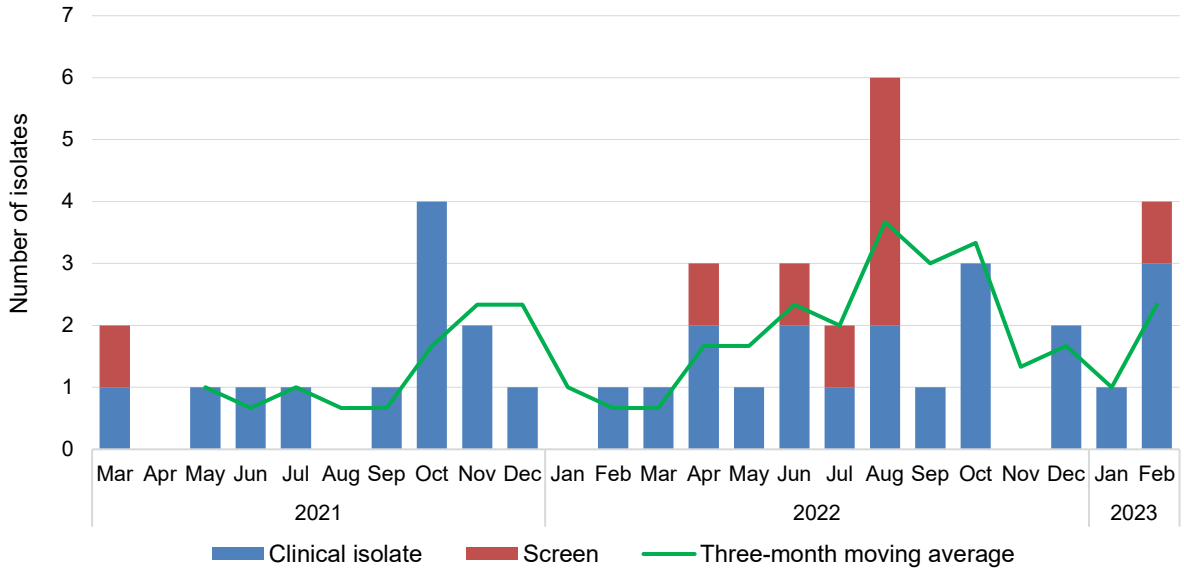
Notes:
1. Reporting of daptomycin-nonsusceptible *S. aureus* was suspended from January 2023.
2. Information on setting for *N. gonorrhoeae* is often not available.

Summary by CAR

Acinetobacter baumannii complex

National data

Figure 1: Carbapenemase-producing *Acinetobacter baumannii* complex, 24-month trend by specimen type, national, 1 March 2021–28 February 2023



State and territory data

Figure 2: Carbapenemase-producing *Acinetobacter baumannii* complex, number reported by carbapenemase type and specimen type, by state and territory, 1 January 2023–28 February 2023

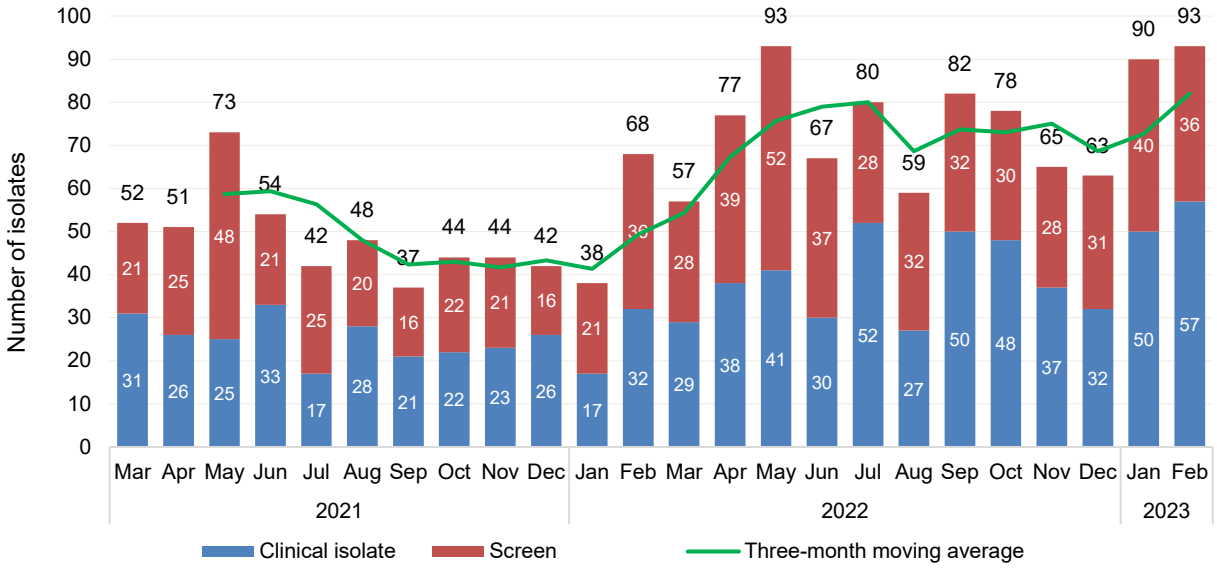
Table 3: Carbapenemase-producing *Acinetobacter baumannii* complex, number reported by setting, by state and territory, 1 January 2023–28 February 2023

Setting	State or territory								Total
	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	
Total	1	3	0	0	1	0	0	0	5
Public hospital	1	3	0	0	0	0	0	0	4
Private hospital	0	0	0	0	1	0	0	0	1
Aged care home	0	0	0	0	0	0	0	0	0
Community	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0

Enterobacterales

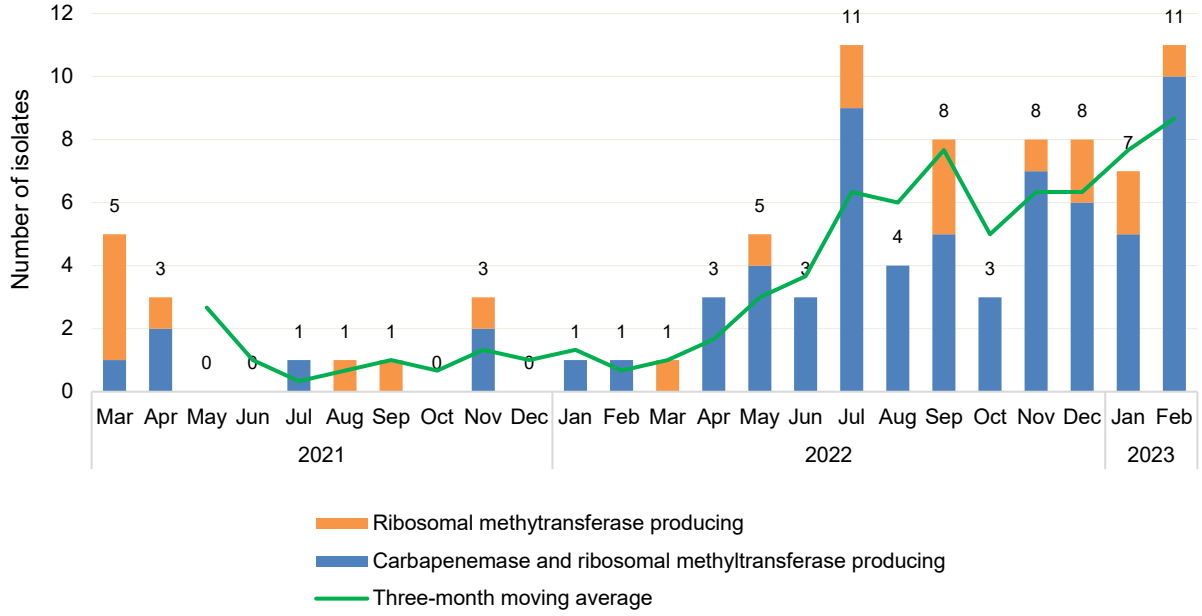
National data

Figure 3: Carbapenemase-producing *Enterobacterales**, 24-month trend by specimen type, national, 1 March 2021–28 February 2023



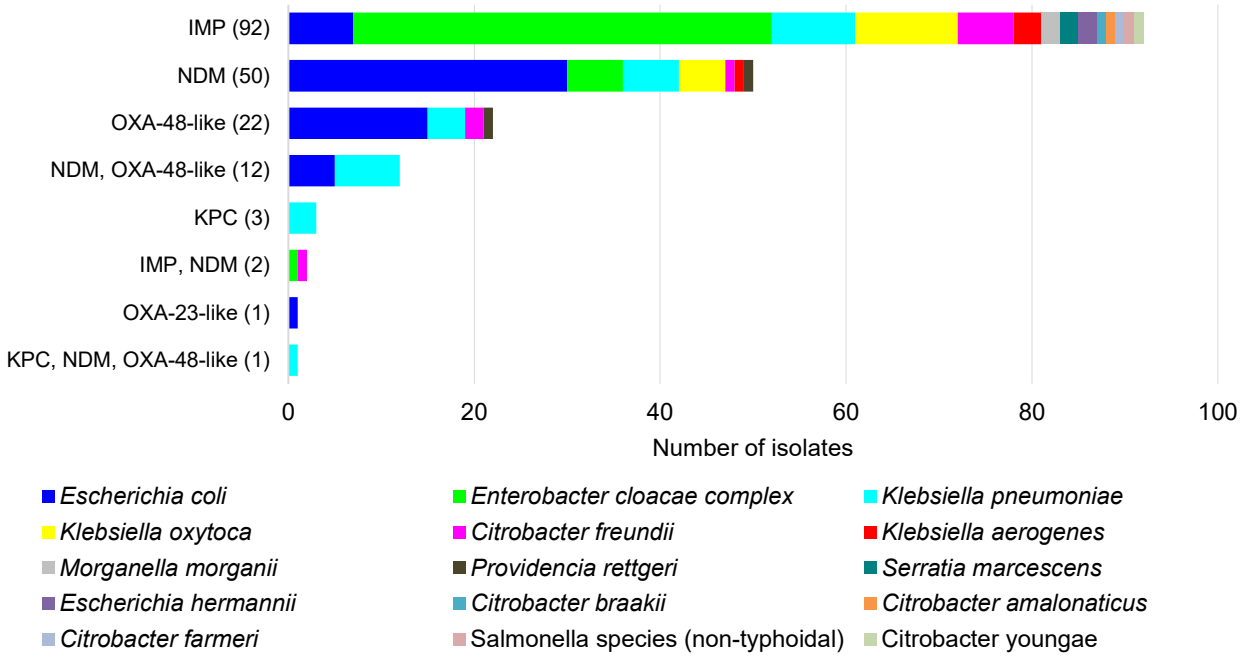
* Carbapenemase-producing alone or in combination with ribosomal methyltransferases

Figure 4: Ribosomal methyltransferase-producing *Enterobacterales**, 24-month trend, national, 1 March 2021–28 February 2023



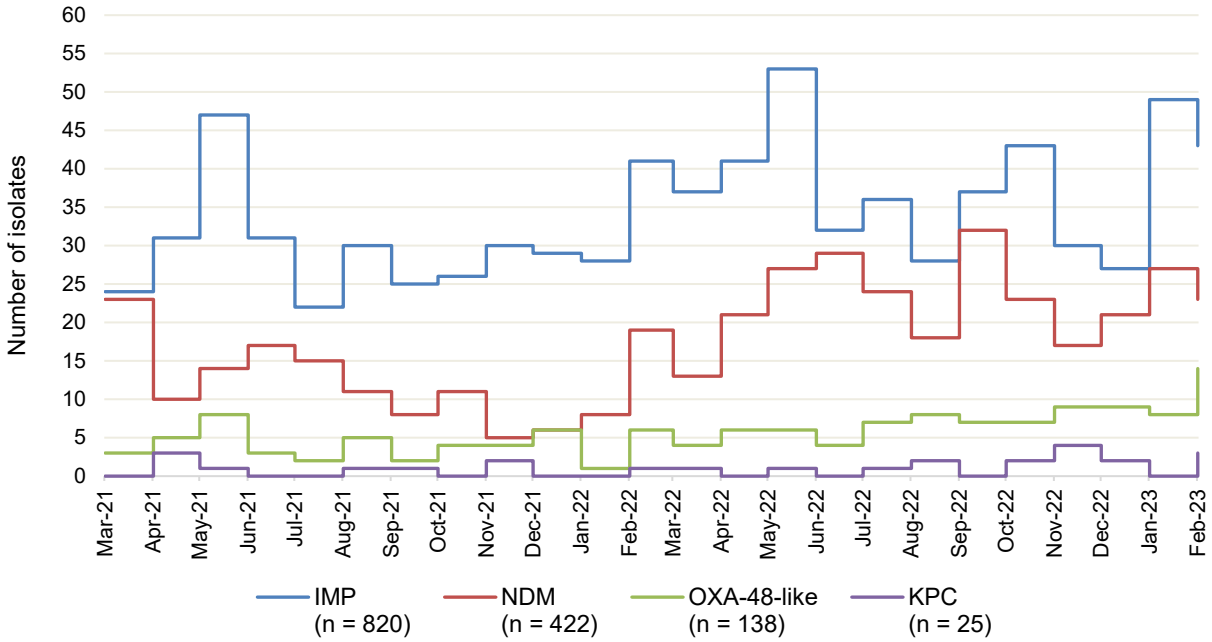
* Ribosomal methyltransferases alone, or in combination with carbapenemase(s)

Figure 5: Carbapenemase-producing *Enterobacterales**, number reported by carbapenemase type and species, national, 1 January 2023–28 February 2023



* Carbapenemase-producing (*n* = 168), carbapenemase and ribosomal methyltransferase-producing (*n* = 15)

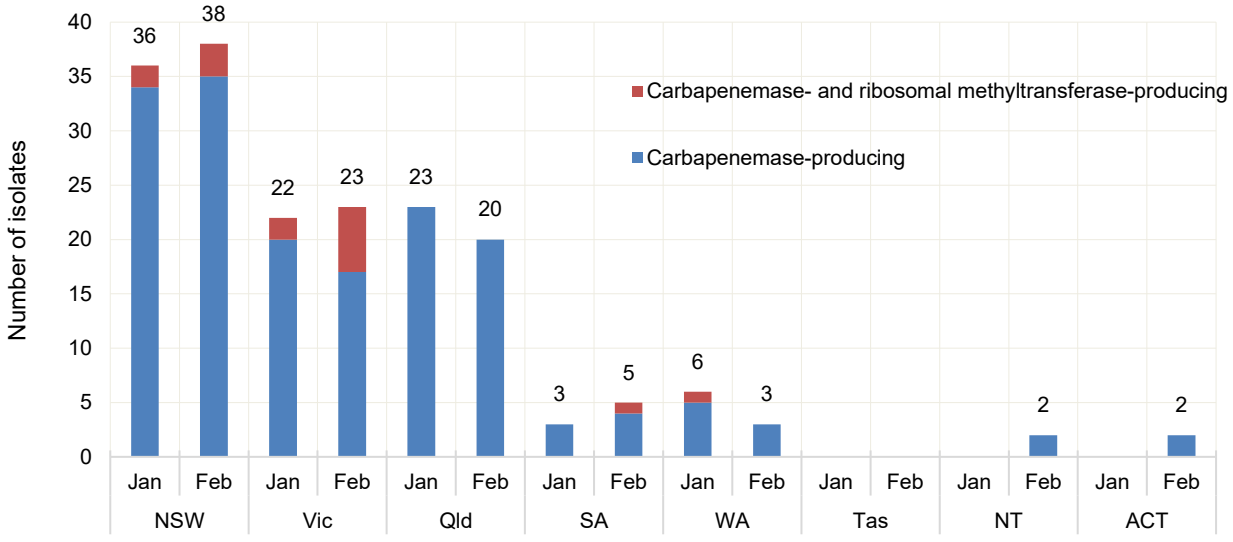
Figure 6: Top four reported carbapenemase types*, 24-month trend, national, 1 March 2021–28 February 2023



* Alone or in combination with another type for the reporting period indicated

State and territory data

Figure 7: Carbapenemase-producing *Enterobacterales**, number reported by month, state and territory, 1 January 2023–28 February 2023



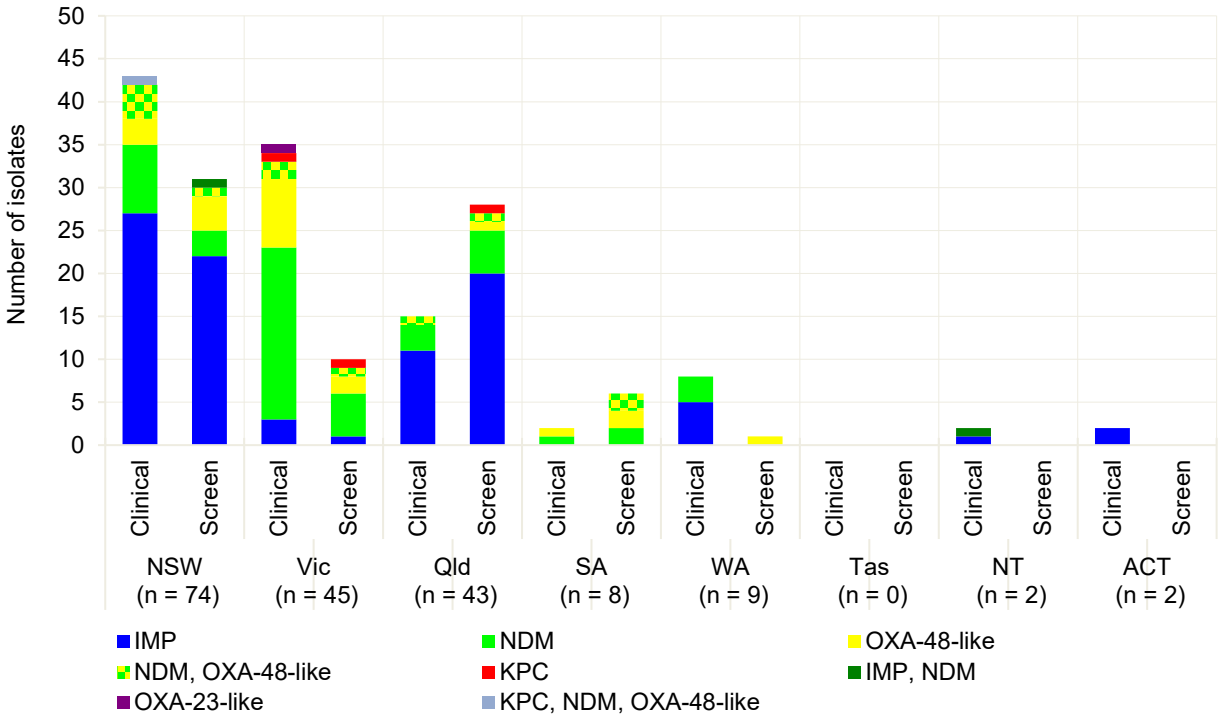
* Carbapenemase-producing (*n* = 168), carbapenemase and ribosomal methyltransferase-producing (*n* = 15)

Figure 8: Two-year trend for the top four reported carbapenemase types from *Enterobacterales*, by state and territory and nationally, (three-month moving average), 1 March 2021–28 February 2023

Type	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Australia
IMP	20 10	5 2	19 8	0 0	2 0	0 0	1 0	1 0	44 26
NDM	6 1	11 3	6 1	5 0	3 0	1 0	1 0	1 0	27 6
OXA-48-like	3 0	5 0	2 0	1 0	1 0	0 0	0 0	1 0	10 2
KPC	2 0	2 0	1 0	1 0	1 0	0 0	0 0	0 0	5 0
All types	31 14	21 8	26 10	6 1	6 1	1 0	1 0	2 0	82 41

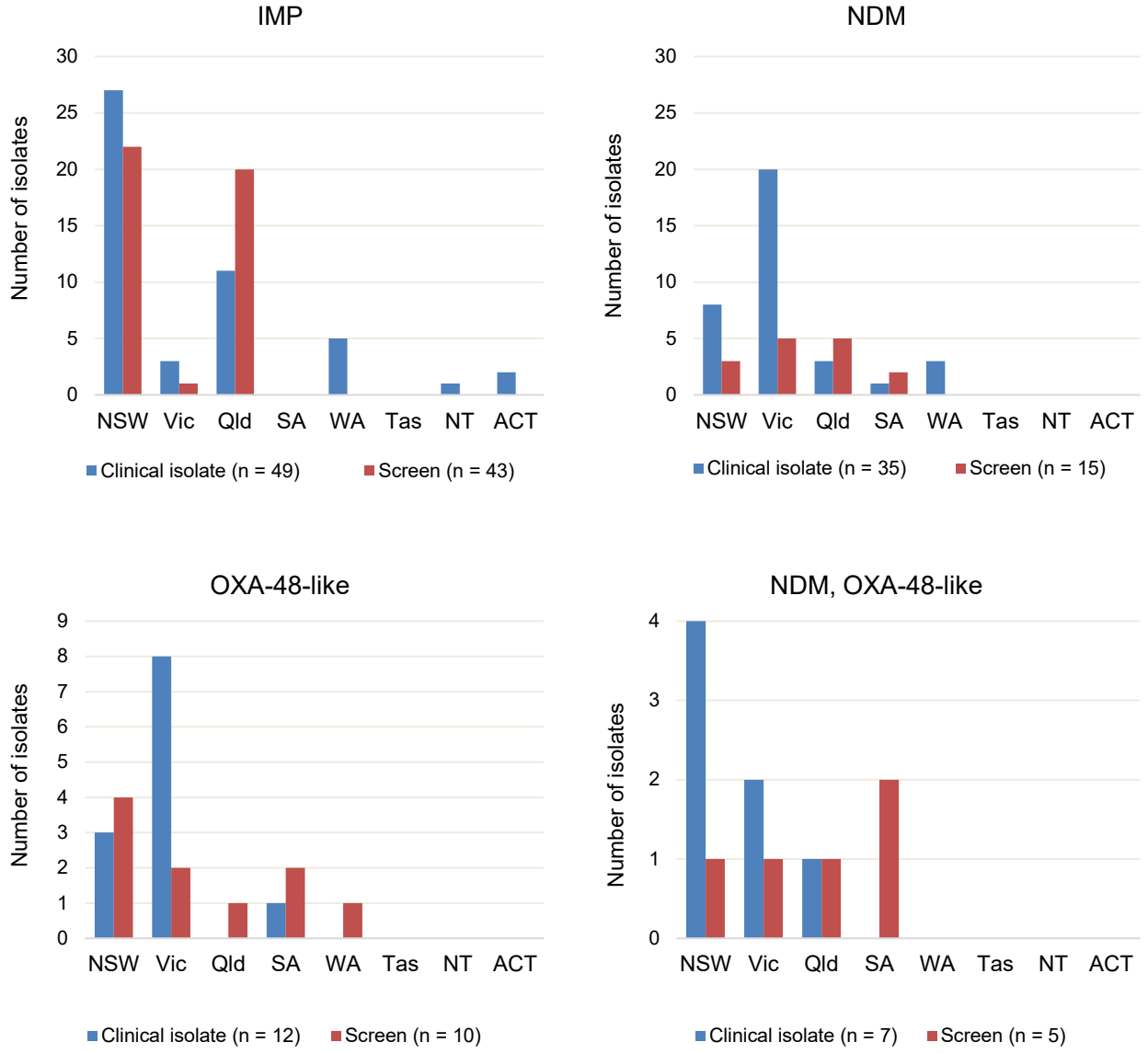
Straight green line in cell = no carbapenemase type for that state or territory during the reporting period;
Blank cell = maximum monthly average was one or less
Note: Line graphs represent three-month moving average for the period 1 March 2021 to 28 February 2023, for each type, where maximum monthly average was greater than one.

Figure 9: Carbapenemase-producing *Enterobacterales**, number reported by carbapenemase type and specimen type, by state and territory, 1 January 2023–28 February 2023



* Carbapenemase-producing (*n* = 168), carbapenemase and ribosomal methyltransferase-producing (*n* = 15)

Figure 10: Top four reported carbapenemase-producing *Enterobacterales* types by specimen type, by state and territory, 1 January 2023–28 February 2023



Note: Other types include KPC (*n* = 3; Vic clinical [1], screen [1]; Qld screen [1]); IMP+NDM (*n* = 2; NSW screen [1]; NT clinical [1]); KPC+NDM (*n* = 1, NSW [clinical]); OXA-23-like (*n* = 1, Vic [clinical]).

Table 4: Top four carbapenemase types from *Enterobacterales*, number reported by setting, by state and territory, 1 January 2023–28 February 2023

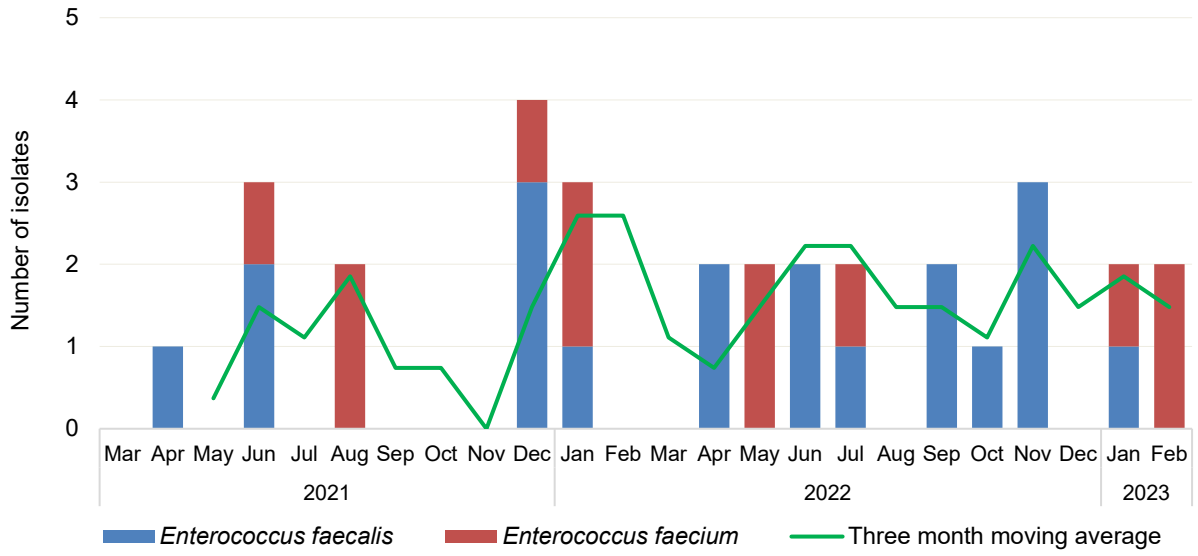
Carbapenemase type	Setting	State or territory								Total
		NSW	Vic	Qld	SA	WA	Tas	NT	ACT	
IMP	Total	49	4	31	0	5	0	1	2	92
	Public hospitals	43	4	24	0	3	0	1	2	77
	Private hospitals	1	0	2	0	1	0	0	0	4
	Aged care homes	0	0	0	0	1	0	0	0	1
	Community	2	0	1	0	0	0	0	0	3
	Unknown	3	0	4	0	0	0	0	0	7
NDM	Total	11	25	8	3	3	0	0	0	50
	Public hospitals	10	15	8	2	2	0	0	0	37
	Private hospitals	0	1	0	1	0	0	0	0	2
	Aged care homes	0	1	0	0	0	0	0	0	1
	Community	1	7	0	0	1	0	0	0	9
	Unknown	0	1	0	0	0	0	0	0	1
OXA-48-like	Total	7	10	1	3	1	0	0	0	22
	Public hospitals	7	6	0	3	1	0	0	0	17
	Private hospitals	0	0	0	0	0	0	0	0	0
	Aged care homes	0	0	0	0	0	0	0	0	0
	Community	0	3	1	0	0	0	0	0	4
	Unknown	0	1	0	0	0	0	0	0	1
NDM, OXA-48-like	Total	5	3	2	2	0	0	0	0	12
	Public hospitals	5	3	2	2	0	0	0	0	12
	Private hospitals	0	0	0	0	0	0	0	0	0
	Aged care homes	0	0	0	0	0	0	0	0	0
	Community	0	0	0	0	0	0	0	0	0
	Unknown	0	0	0	0	0	0	0	0	0

Note: Top four carbapenemase types account for 96.2% (176/183) of all carbapenemase-producing *Enterobacterales* reported for this period. Other types were KPC (*n* = 3, Vic [2], Qld [1]), IMP+NDM (*n* = 2, NSW, NT); OXA-23-like (*n* = 1, Vic); KPC+NDM+OXA-48-like (*n* = 1, NSW).

Enterococcus species

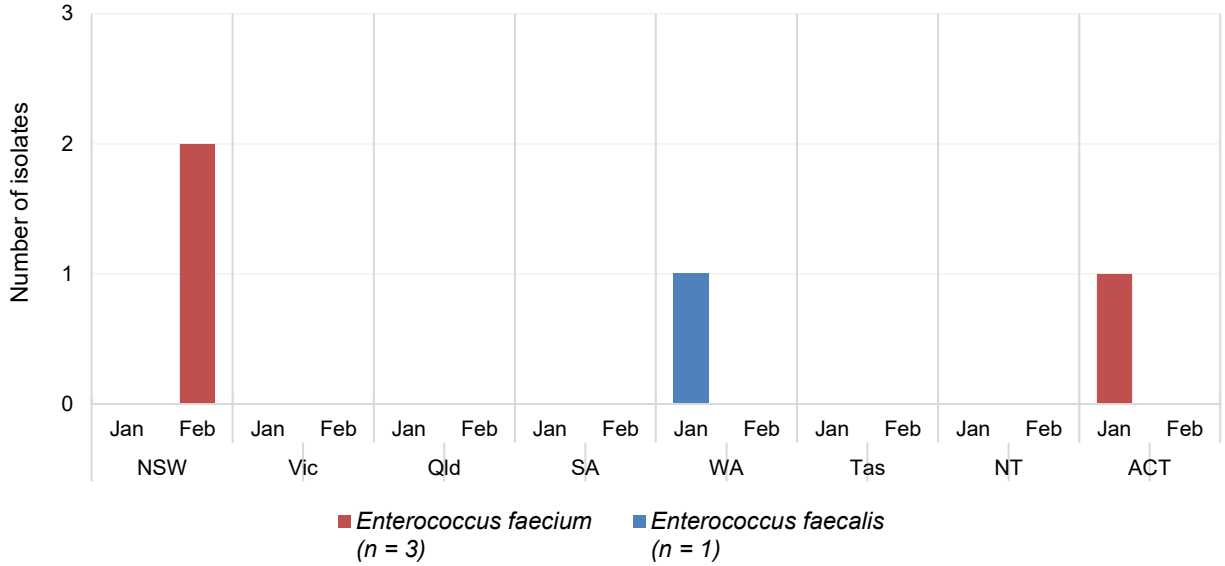
National data

Figure 11: Linezolid-nonsusceptible *Enterococcus* species, 24-month trend, national, 1 March 2021–28 February 2023



State and territory data

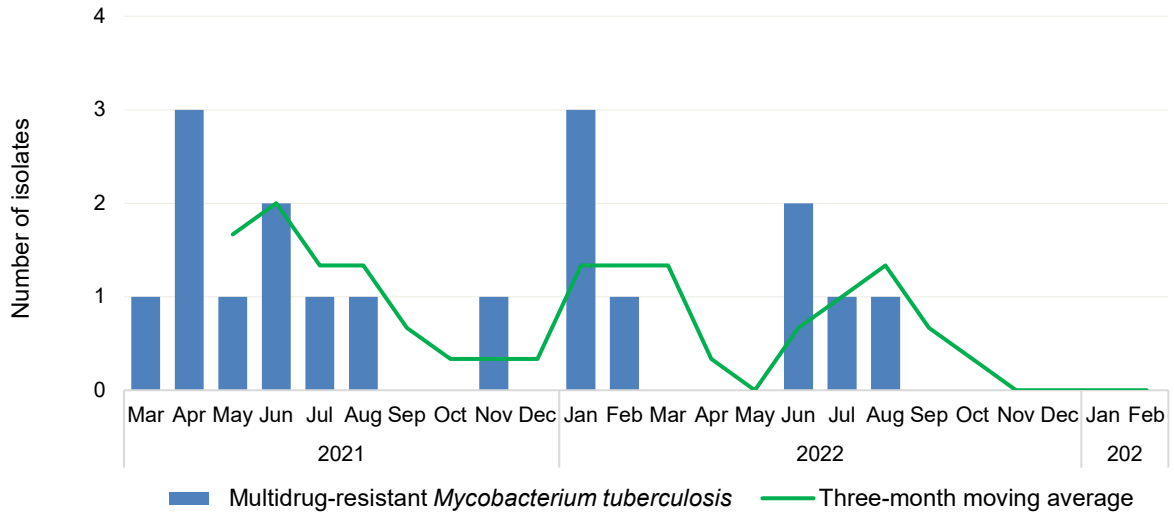
Figure 12: Linezolid-nonsusceptible *Enterococcus* species, number reported by state and territory, 1 January 2023–28 February 2023



Mycobacterium tuberculosis

National data

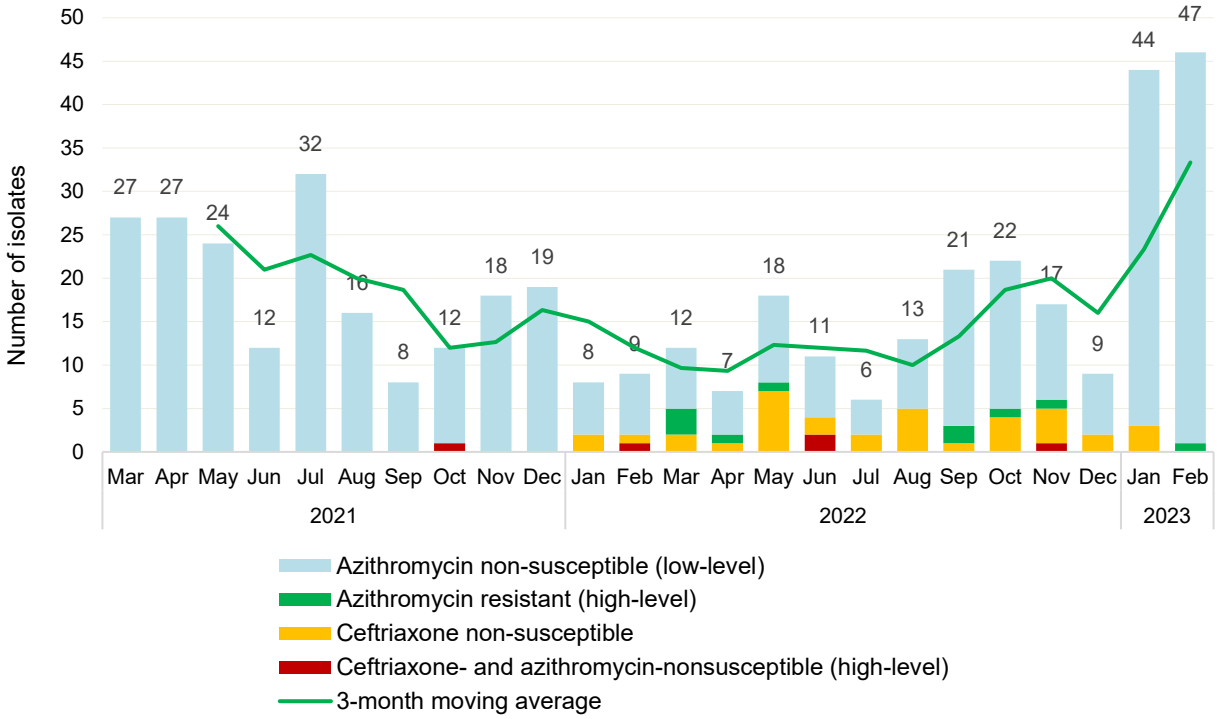
Figure 13: Multidrug-resistant *Mycobacterium tuberculosis,* 24-month trend, national, 1 March 2021–28 February 2023



Neisseria gonorrhoeae

National data

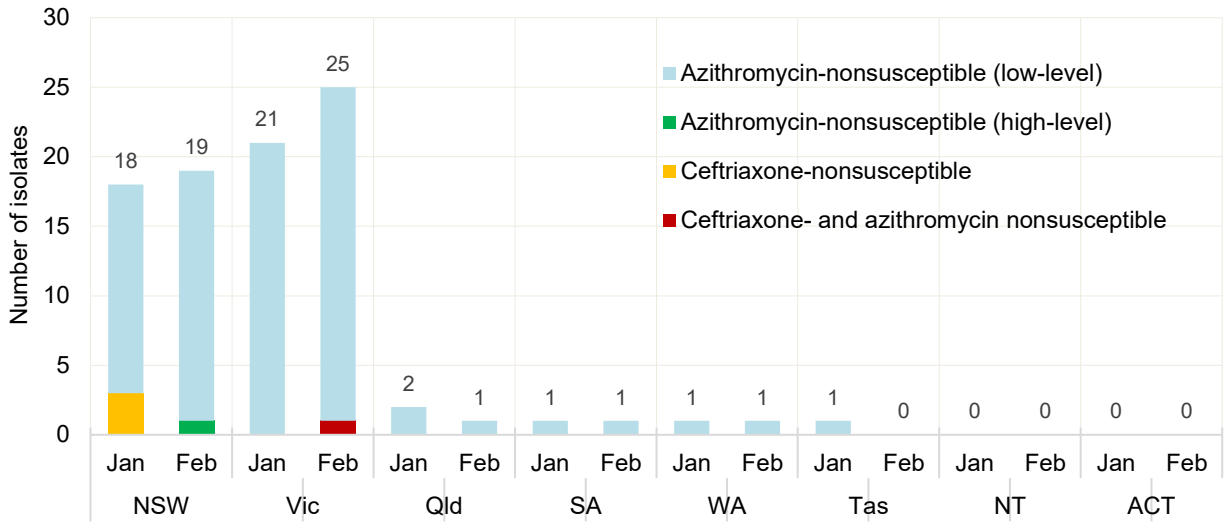
Figure 14: Ceftriaxone- and/or azithromycin-nonsusceptible *Neisseria gonorrhoeae*, 24-month trend, national, 1 March 2021–28 February 2023



Note: Low-level = azithromycin MIC < 256 mg/L; high-level = azithromycin MIC ≥ 256 mg/L.

State and territory data

Figure 15: Ceftriaxone- and/or azithromycin-nonsusceptible *Neisseria gonorrhoeae,* number reported by month, state and territory, 1 January 2023–28 February 2023

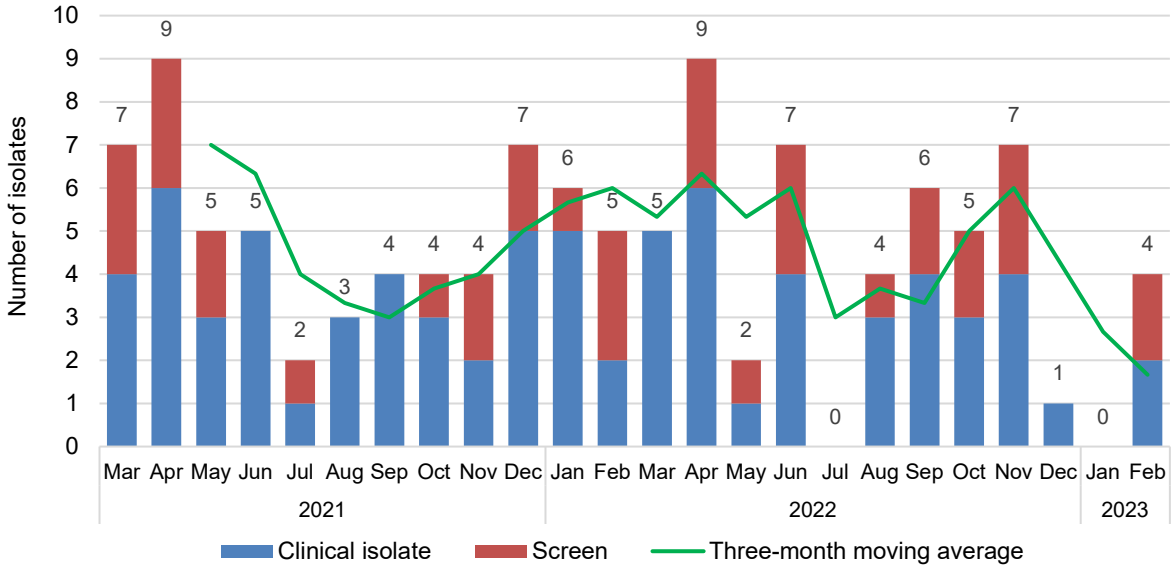


Note: Low-level = azithromycin MIC < 256 mg/L; high-level = azithromycin MIC ≥ 256 mg/L.

Pseudomonas aeruginosa

National data

Figure 16: Carbapenemase-producing *Pseudomonas aeruginosa*, 24-month trend by specimen type, national, 1 March 2021–28 February 2023



State and territory data

Figure 17: Carbapenemase-producing *Pseudomonas aeruginosa*, number reported by carbapenemase type and specimen type, by state and territory, 1 January 2023–28 February 2023

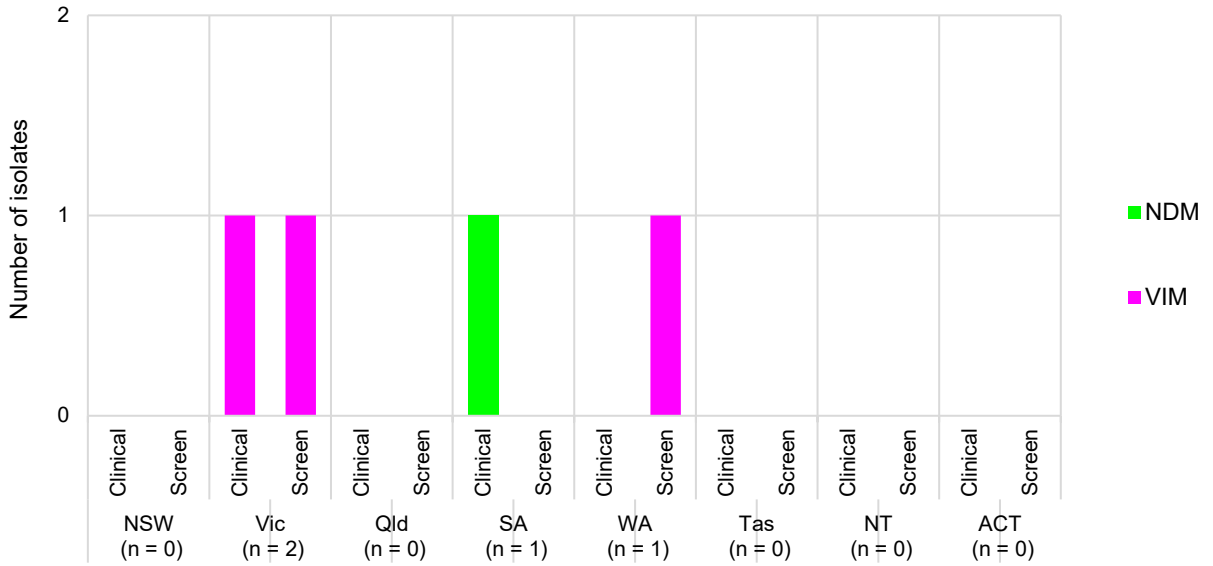


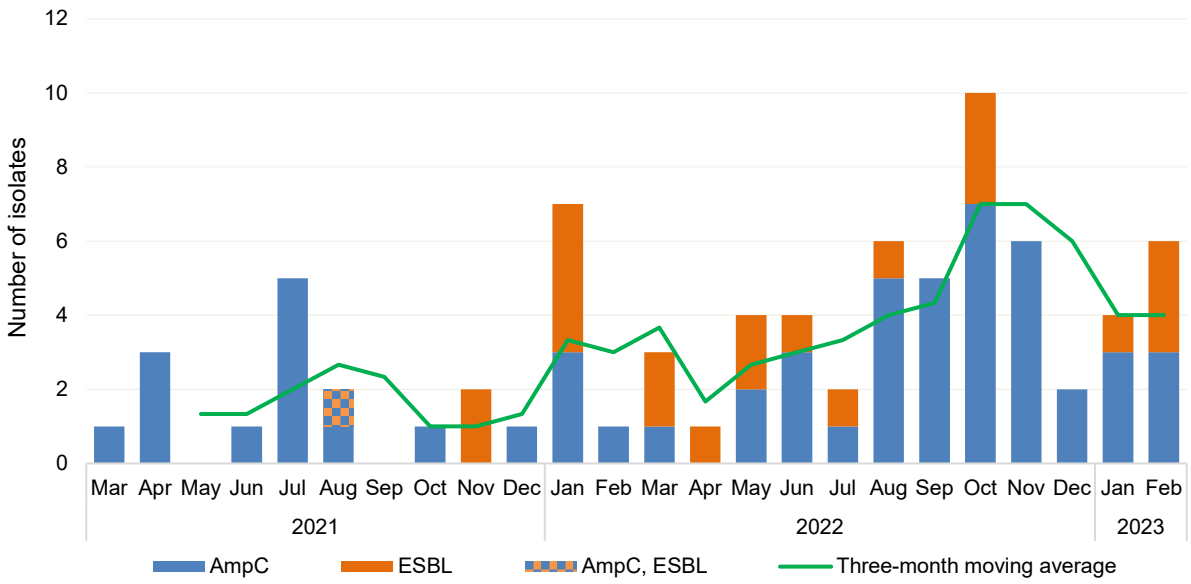
Table 5: Carbapenemase-producing *Pseudomonas aeruginosa*, number reported by setting, by state and territory, 1 January 2023–28 February 2023

	State or territory								
Setting	**NSW**	**Vic**	**Qld**	**SA**	**WA**	**Tas**	**NT**	**ACT**	**Total**
Total	0	2	0	1	1	0	0	0	4
Public hospital	0	1	0	1	1	0	0	0	3
Private hospital	0	0	0	0	0	0	0	0	0
Aged care home	0	0	0	0	0	0	0	0	0
Community	0	1	0	0	0	0	0	0	1
Unknown	0	0	0	0	0	0	0	0	0

Salmonella species

National data

Figure 18: Ceftriaxone-nonsusceptible *Salmonella* species, 24-month trend, national, 1 March 2021–28 February 2023



Note: (1 January 2023–28 February 2023) non-typhoidal *Salmonella* species (*n* = 4) and typhoidal *Salmonella* species (*n* = 6).

Shigella species

National data

Figure 19: Multidrug-resistant *Shigella* species, 24-month trend, national, 1 March 2021–28 February 2023

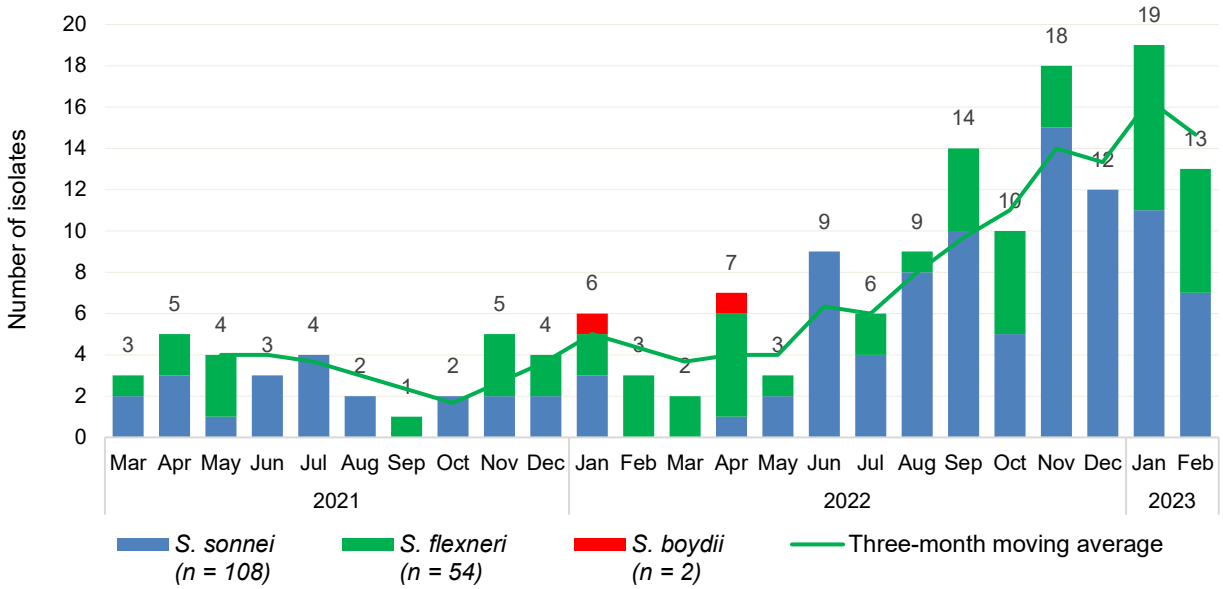
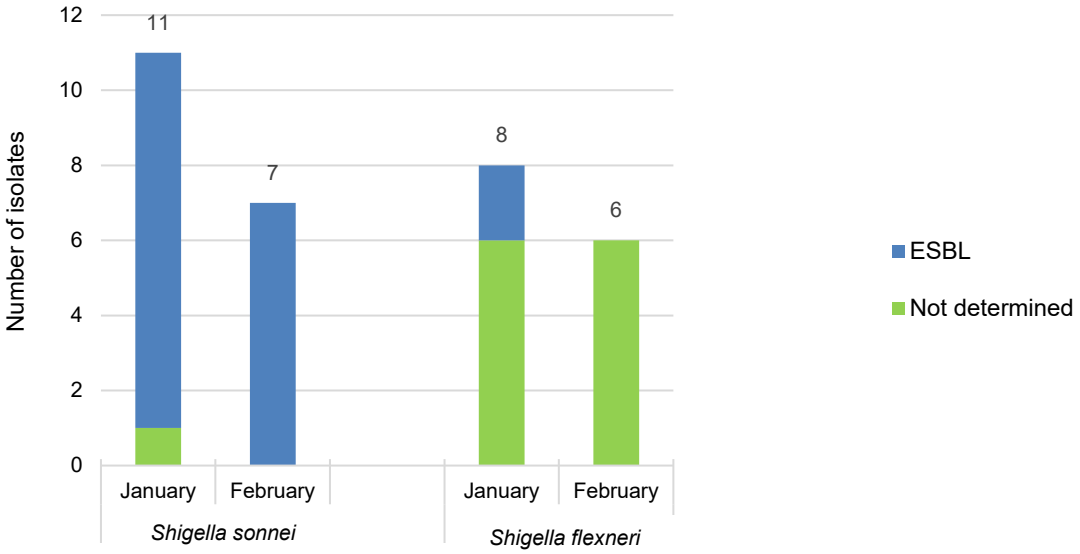


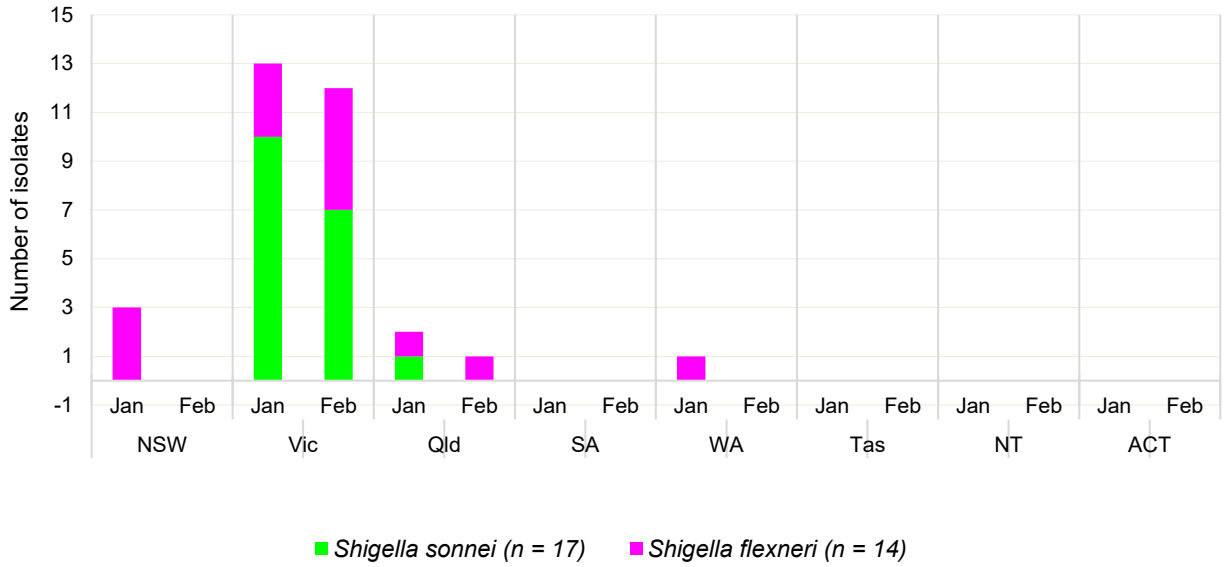
Figure 20: Multidrug-resistant *Shigella* species, number reported by month, national, 1 January 2023–28 February 2023



Note: Not determined = multidrug-resistant, ceftriaxone/cefotaxime-susceptible.

State and territory data

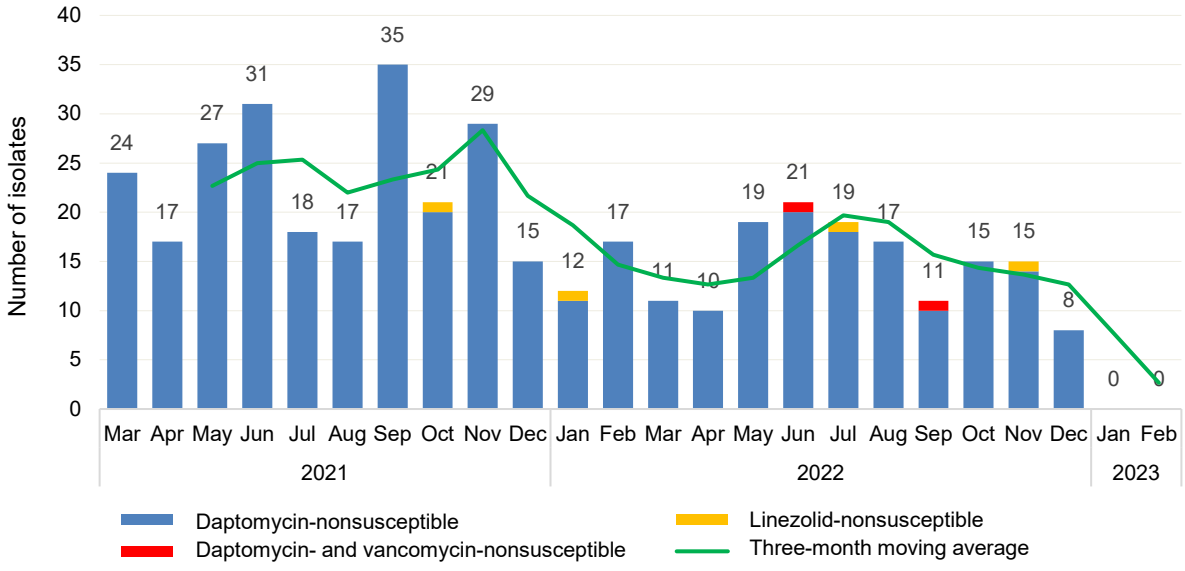
Figure 21: Multidrug-resistant *Shigella* species, number reported by state and territory, 1 January 2023–28 February 2023



Staphylococcus aureus

National data

Figure 22: Daptomycin-, linezolid- or vancomycin-nonsusceptible *Staphylococcus aureus,* 24-month trend, national, 1 March 2021–28 February 2023



Note: Reporting of daptomycin-nonsusceptible *S. aureus* was suspended from January 2023.

State and territory data

There was no linezolid- or vancomycin nonsusceptible *S. aureus* reported during this period.

Appendix

Data Notes

The following are important considerations for interpreting CARAlert data:

- The data are based on the date that the isolate with the confirmed CAR was collected
- States and territories refer to the state or territory within which the hospital is located, or within which the patient resides for isolates from the community. If place of residence is unknown or overseas, the state or territory of the originating laboratory is reported
- Comparison between reports may be influenced by delayed detection or late submissions of CARs
- The same CAR/type/species is not submitted where the sample originated from the same patient who had the previous CAR, and the isolate was collected on the same day, or collected in the same admission or within three months
- Number of CARs reported does not always equal the number of patients, as patients may have more than one CAR, or species, detected in a specimen
- Cut-off date for data that are included in updates and reports is four weeks after the end of each reporting period
- National summary data is provided; comparison across states and territories is provided for organisms where there are large numbers reported and a comparison is meaningful
- Authorised officers in each state and territory health department can access the CARAlert web portal directly for further information about their jurisdiction, including the name of the public hospital in which a patient with a confirmed CAR was cared for, and to extract reports on their data.

About AURA and CARAlert

The Antimicrobial Use and Resistance in Australia (AURA) Surveillance System provides essential information to develop and implement strategies to prevent and contain antimicrobial resistance in human health and improve antimicrobial use across the acute and community healthcare settings. AURA also supports the National Safety and Quality Health Service (NSQHS) Preventing and Controlling Infections Standard and Australia's National Antimicrobial Resistance Strategy – 2020 and beyond.

The National Alert System for Critical Antimicrobial Resistances (CARAlert) was established by the Australian Commission on Safety and Quality in Health Care (the Commission) in March 2016 as a component of the AURA Surveillance System. Funding for CARAlert is provided by the Australian Government Department of Health and Aged Care, with contributions from the states and territories for the laboratory analysis and data submission processes.

Participating confirming laboratories submit data to CARAlert on priority organisms with critical resistance to last-line antimicrobial agents (CARs) which can result in significant morbidity and mortality. Isolates collected from patients are reported to CARAlert as either a clinical isolate, that is a specimen (e.g., from blood, urine, wound) taken to guide clinical diagnosis, or as a screen for infection prevention and control purposes. No patient-level data are held in the CARAlert system.

The CARs reported to CARAlert are listed in Table A1. These CARs were drawn from the list of high-priority organisms and antimicrobials which are the focus of the AURA Surveillance System.[1]

[1] Australian Commission on Safety and Quality in Health Care. AURA 2021: fourth Australian report on antimicrobial use and resistance in human health. Sydney: ACSQHC; 2021.

Table A1: List of critical antimicrobial resistances reported to CARAlert

Species	Critical resistance
Acinetobacter baumannii complex	Carbapenemase-producing*
*Candida auris**	–
Enterobacterales	Carbapenemase-, and/or ribosomal methyltransferase-producing
Enterobacterales	Transmissible colistin resistance*
Enterococcus species	Linezolid-resistant
Mycobacterium tuberculosis	Multidrug-resistant – resistant to at least rifampicin and isoniazid
Neisseria gonorrhoeae	Ceftriaxone- or azithromycin§-nonsusceptible
	Gentamicin-resistant†
Neisseria meningitidis	Ciprofloxacin-nonsusceptible†
Pseudomonas aeruginosa	Carbapenemase-producing*
Salmonella species	Ceftriaxone-nonsusceptible
Shigella species	Multidrug-resistant
Staphylococcus aureus complex#	Vancomycin- or linezolid-nonsusceptible§
Streptococcus pyogenes	Penicillin reduced susceptibility

* Reported from July 2019
† Reported from January 2023
§ Reporting of daptomycin-nonsusceptible *S. aureus* was suspended from January 2023
\# For CARAlert, *S. aureus* includes *S. argenteus* and *S. schweitzeri*

Note: Low level-azithromycin-nonsusceptible *N. gonorrhoeae* excluded from the weekly digest following review in 2018.

In 2022, the Commission conducted a review of CARAlert to assess whether currently reported CARs continue to be priorities, and to identify any additional CARs for inclusion. The review followed a similar process to previous reviews in 2016 and 2018. In consultation with states and territories and a range of clinical experts, the 2022 review identified two new CARs that have been reported to CARAlert since 1 January 2023:

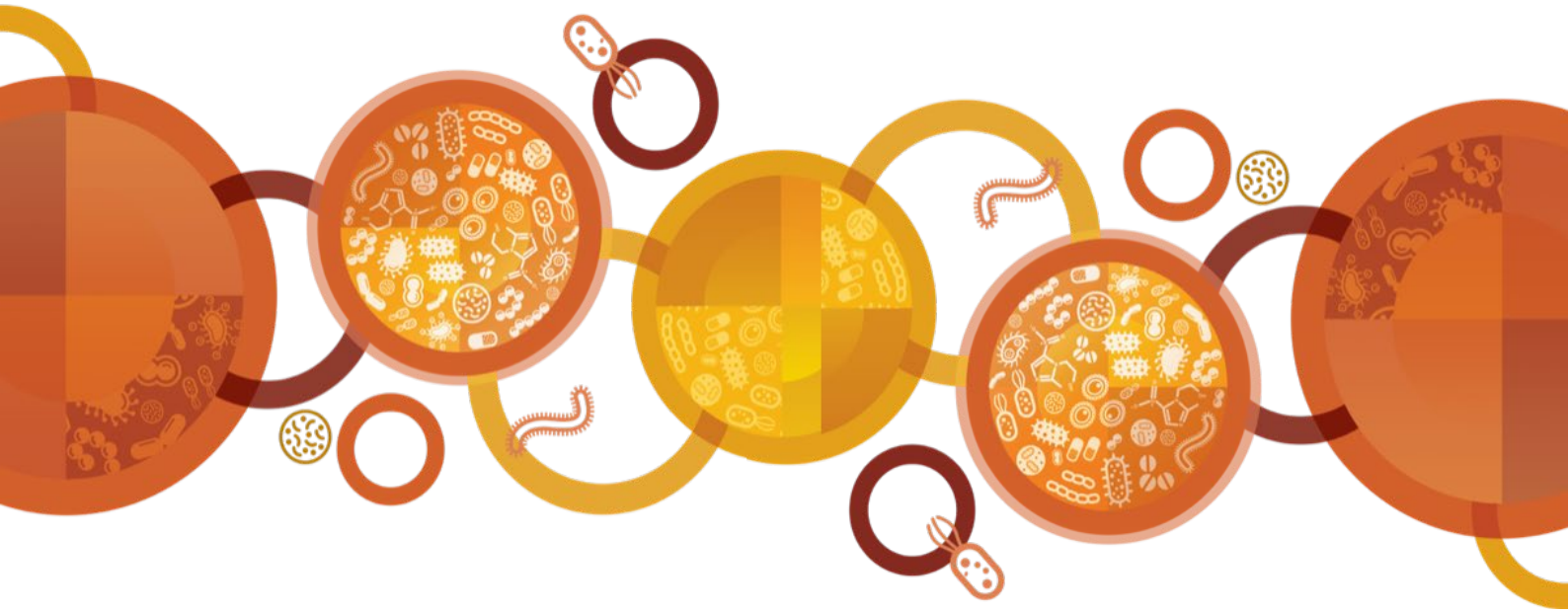
- Ciprofloxacin-nonsusceptible *Neisseria meningiditis*
- Gentamicin-resistant *N. gonorrhoeae*.

Additionally, reporting of daptomycin-nonsusceptible *Staphylococcus aureus* (DNSA) was suspended from 2023. Reintroduction of reporting of DNSA will be considered when more reliable testing methods are available.

The CARAlert system is based on the following routine processes used by pathology laboratories for identifying and confirming potential CARs:

1. Collection and routine testing – the isolate is collected from the patient and sent to the originating laboratory for routine testing
2. Confirmation – if the originating laboratory suspects that the isolate is a CAR, the isolate is sent to a confirming laboratory that has the capacity to confirm the CAR
3. Reporting to clinicians in accordance with usual laboratory processes – the confirming laboratory reports back to the originating laboratory, which in turn reports to the clinician who initially requested the microbiological testing

4. Submission to the CARAlert system – the confirming laboratory advises the originating laboratory of the result of the test, and the originating laboratory reports back to the health service that cared for the patient from whom the specimen was collected; the confirming laboratory then submits the details of the resistance and organism into the secure CARAlert web portal.



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